Experts at arm's length of public policymakers: a case study on Utrecht

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A CASE STUDY ON UTRECHT

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Summary
In the practice of spatial economic planning for the near and far future, regional planners in most cases are confronted with often conflicting interests of stakeholders in a region. In this paper we will apply the 'spider model' as an expert approach to the process of building consensus between stakeholders of different interest groups: government, employers, trade unions, environmental and other pressure groups.
In these spiders the actual, expected and desired developments of regional key variables are shown as a consistent set of mutual dependent relations of which a change in the position of one of the variables leads to feedback effects in all other variables. By means of these spiders the interests of stakeholders can be shown to other players in the field, resulting in an improved understanding of interests and arguments of countervailing stakeholders. Mutual respect for and understanding of each others interests enhances the possibility to reach a regional spatial economic development pathway based on a common consensus.

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1. The New Regional Policy Scene

A region is not a uniform space but has a set of geographically differentiated and discriminated opportunities. Consequently, the identification and exploitation of strong local attraction forces and chances constitutes a major challenge for modern policy-makers. To reinforce the development potential of a heterogeneous portfolio of local and regional identities sufficient insight into driving forces, megatrends, bottlenecks and regulations at the local and regional level is required. Scientific research and spatial planning are vehicles to meet this need of policy-makers. In this context regional and urban marketing is also of great importance (see Keams and Philo, 1993). A clear focus on local resources and local economic development factors is a policy-relevant mission against this background (see also Syrett, *1995;* Wong, 1998).

It should also be recognised that the regional and local development scene is not a static situation, but is increasingly in a state of flux with various - sometimes unforeseen or unexpected - dynamic processes. These processes are caused by changing role patterns of stakeholders, which tend to make a stable policy less likely or successful. Since the belief in the makeability of society has also faded away, fixed target policy or blueprint planning is not a realistic policy approach anymore. Consequently, regions and localities are confronted with a great deal of uncertainty. This forces them to be more self-reliant on the basis of learning and adaptive mechanisms (see Van Geenhuizen and Nijkamp, 1998).

The above mentioned awareness has led to the concept of a 'learning region', i.e., a region which tries to get a better performance through an active and comprehensive learning process, using a body of creative knowledge. The concept of a learning region is usually associated with the need for an improved competitiveness in open markets with a view to the improvement of the actors' performance. Often learning takes place via communication and knowledge networks, and this is the way experts may get in touch with the policy domain (see also Morgan, 1997; Simmie, 1997). According to Van Geenhuizen and Nijkamp (1998) the performance indicators of learning regions are related to the following phenomena:

- *Consensus* among the regional actors involved. Learning as a collective action needs to be accepted as a meaningful strategy. In addition, a certain level of trust is necessary, so that the benefits of learning are also contingent on its acceptance.
- *Networking to advance knowledge creation and flow.* Innovation is an *interacting* process within firms, between firms (suppliers, contractors), and between firms and various institutes. Accordingly, networking is important to enhance serendipity.

  Transformation of knowledge. Knowledge cannot always flow smoothly, due to differences in vocabulary and frameworks. Therefore, transformation is necessary, for example, between basic knowledge and applied knowledge, and between different disciplines.
- *Management of human capital.* This refers to the resident population and the workforce in local firms. There needs to be sufficient investment in skills for learning and skills for management, and for learning itself in art and science, at different levels, in different combinations, and by using formal as well as informal education.
- *Management of (public) stocks of knowledge.* This includes the updating of archives, libraries etc., and providing access to them.
- *Identification of new learning and knowledge needs.* This condition is concerned with the monitoring of needs while anticipating new developments. Producing early warning signals is important here.

These factors may assist in building a self-organising regional, local socio-economic and political power which may reinforce the regional window of opportunities, while taking into account the socio-economic potential and spatial-environmental sustainability conditions. Clearly, regions are increasingly operating in a conflicting force field.

The increasing social awareness within society and the increasing ability to stand for important social issues by stakeholders, such as environmental pressure groups, has led to a more complicated spatial planning process. The spatial planners not only have to deal with other governmental colleagues and politicians, but also have to deal with stakeholders from employers' organisations, trade-unions, environmental, local or regional pressure groups ,which have direct and/or indirect interests in the process at stake. Society demands a more open process of spatial planning in which the public is offered the opportunity of consultation. On the other hand planners want to secure their plans by trying to reach a common consensus. So, openness in the process of policy making has two advantages: the public has the opportunity to participate in the policy process and the policy makers are well informed and can adjust plans to the desires and interests of the public. A disadvantage of the openness of policy making is the probability of time delays due to this communication towards and interaction with the public.

In this paper we apply a scenario approach - visualised by so-called spider models - to accommodate the policy making process, including extensive communication and interaction between spatial planners and stakeholders in the region. In section 2 the applied scenario approach is highlighted. Furthermore, the spider model is introduced and the way in which scenarios - visualised by spider models - can support the spatial planning process through communication between decision makers and stakeholders. In section 3 a case study involving municipalities in the province of Utrecht is given. Finally, section 4 offers some concluding remarks.

2. The scenario approach and the use of spider models

2.1 *The background of scenarios*

The future regional development is surrounded by uncertainties, because the development of the region is influenced by many factors which can develop in various ways. We onlv mention the uncertainty about the general economic development, demography and environmental quality. Scenarios are useful in analysing possible futures and the impacts of several policy packages. In our paper four contrasting qualitative scenarios representing extreme development directions are constructed to draw the edges of the planning field in which regional economic development will take place.

In this section we will offer a short overview of the specific scenario methodology and the applied spider models. For a concise overview of scenario methodology we refer to Rienstra (1998).

A scenario can be defined as '*a tool that describes pictures of the future world within a specified framework and under specified assumptions. The scenario approach includes the description of at least two or more scenarios, designed to compare and examine alternative futures*' (EU, 1994).

Scenario writing may then be defined as '*a process to create, register, discuss, analyse, synthesise! document, store, retrieve and present information that is useful for the future and the development process to reach it'* (Sviden, 1989).

The scenario approach is a decision support tool to reduce uncertainty - regarding the likelihood of future developments in the region - of decision makers. The opportunities to use a scenario approach in the discussion between decision-makers and stakeholders are the following (see Steenbergen, 1983 for the functions of scenarios and future research):

- information function; scenarios provide information about all relevant factors;
- exploring function; scenarios reflect all the mutual relationships between all relevant factors (the information and exploring function sketch the context of the process);
- communication function; scenarios offer the opportunity to discuss about all relevant factors and their mutual relationships;
- understanding function; scenarios are means to achieve greater mutual understanding of various interests by stakeholders;
- demonstration function; scenarios show the mutual consequences of specific decisions;
- legitimisation function; scenarios can convince stakeholders that certain action is needed;
- acceptance function; scenarios can persuade stakeholders to accept certain policy measures as they are placed in a broader context.

In this study stakeholders can be defined as *'a group of individuals which has specific interests regarding the future of spatial economic development and has the opportunity to influence the decision-making process to serve these interests'* (cf. Rienstra, 1998).

Scenarios reduce complexity and facilitate discussion about future events by arranging and classifying information and preventing information overload (Rienstra, 1998).

There are several - overlapping - ways to construct scenarios. Descriptive scenarios are mainly based on knowledge about past and current trends and are based on expectations of how these trends will develop in the future. Normative scenarios may be constructed by applying norms and values. In this study normative scenarios - based on the present situation - are used. Four contrasting scenarios are composed, each representing an edge of the playing field in which the spatial economic development of the region should take place. However, the final scenario is a descriptive one; based on desk-research and expert opinions about the expected and desired future.

In this study we will apply forecasting scenarios. The scenarios are based upon the current situation and paths leading to it. An alternative approach would be backcasting in which an image of the future is constructed and afterwards policy paths are developed on how to achieve the image given the present situation.

We will present a combination of expert- and constructor-based scenarios. Information obtained from desk-research and interviews with experts - decision makers and stakeholders - is used to construct four scenarios representing the edges of the playing field and the concept scenario. At the end, the experts validated the concept scenario into the final - expert-based - scenario.

The four scenarios representing the boundaries of the playing field are reference scenarios; they provide extreme pictures of the future by assuming extreme developments and policies. In this way they provide a reference framework for often less extreme scenarios, and may also clarify policy choices and their impacts (Rienstra, 1998). The final scenario is a knowledge based scenario, based on surveying, literature scans, interviews and Delphi-sessions (Sviden, 1989). The knowledge scenario is constructed by using scientific insights into future developments. into possible, likely and desirable policy measures and into their impacts (Rienstra, 1998).

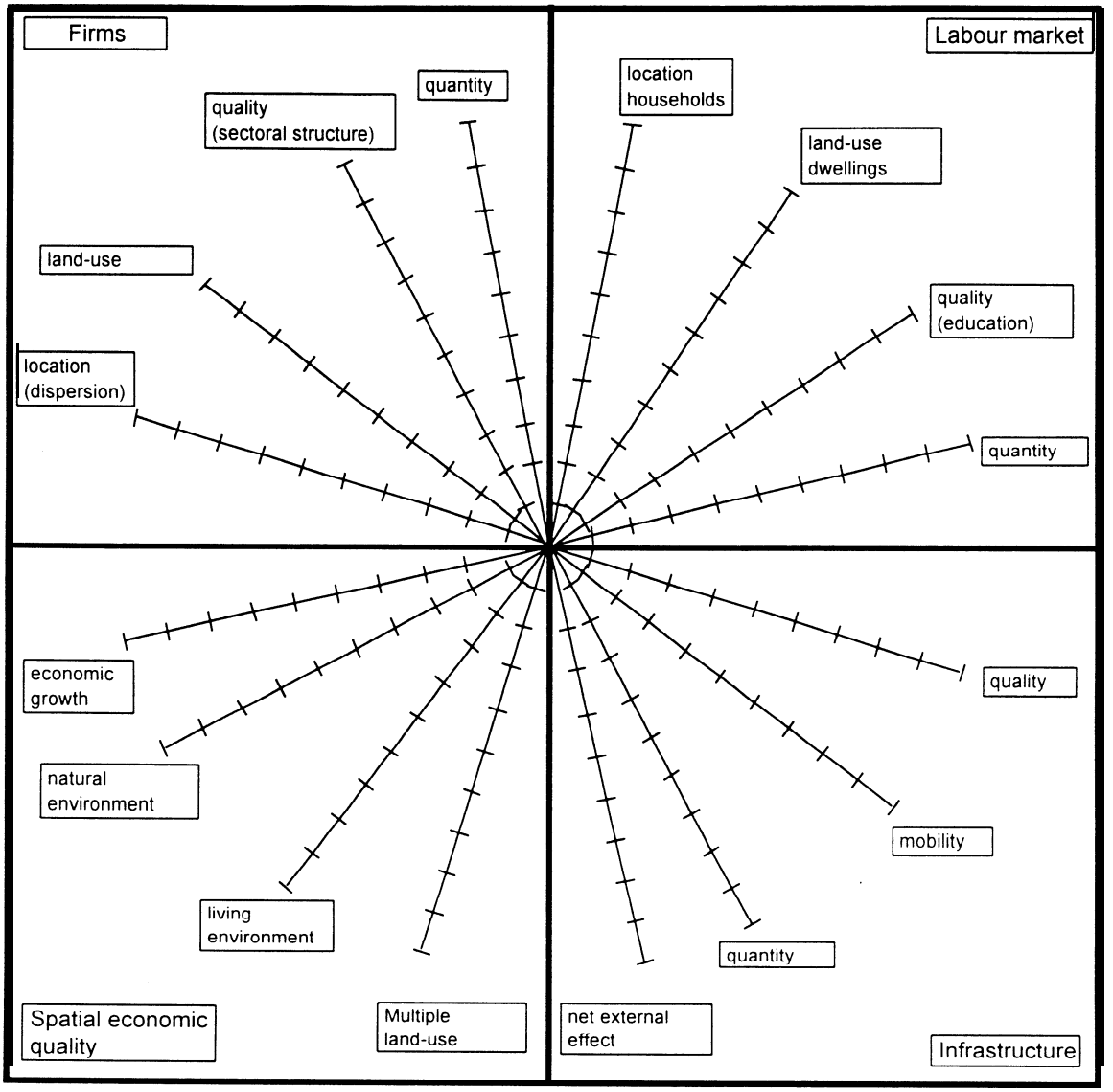


Figure 1 The spider model

2.2 Background of the spider models

Spider models are used to visualise the different scenarios. In the context of our experiment two axes are drawn dividing the spider field into four quadrants: one for each main spatial economic issue: firms, labour market, infrastructure and spatial economic quality. Each quadrant covers four key factors (see also figure 1):

- firms: quality (sectoral structure)
  quantity
  location (dispersion)
  land-use
- labour market: quality (education)
  quantity
  location households
  land-use dwellings
- infrastructure: quality
  quantity

mobility
net external effect

- spatial economic quality: economic growth
living environment
natural environment
multiple land-use

Each factor in each quadrant is represented by an axis starting from the interior towards the outer boundary of the spider. The axis are scaled from one (interior) to ten (outer edge). All factors are scored on this range under the assumption that a higher score represents a better performance. For the present situation the score of each factor is often based on statistical information or other quantitative information. Nevertheless, there is no weighing between the factors. In other words: a score of 6 on one factor is as important as a score of 6 on each other factor. Also the scores of the factors for the contrasting future performances is qualitative. However, the direction and the size of the changes in the scores of the factors are mutually consistent for the constructed future scenarios. So, the direction and the relative size of the impacts of each future scenario is comparable to the direction and size of the impact of all other scenarios. Nevertheless, the absolute size of each impact remains qualitative and by that it is disputable. In this respect the independent position of the scientist proposing the scenarios - and its effects - should be indisputable accepted by all parties involved in the planning process.
All scores per factor are connected resulting in a surface representing the integrated mutual relationship between these factors. The advantage of this visualisation by means of spiders is that it is easy to understand how a change in the score of one of the factors might affect the scores of all other factors irrespective to the field the changing factor belongs to. In this way it can be explained to, for instance, a stakeholder representing natural environmentalists, that an improvement of the natural environment might have repercussions for the level of mobility in the region or the sectoral structure of the region.

2.3 *Scenarios and spatial economic planning*

As already mentioned in section 2.1 we have constructed four reference scenarios describing the boundaries of the playing field. In order to construct those reference scenarios one needs insight in the strengths, weaknesses, opportunities and threats of the region. Such a SWOT-analysis took place by desk-research and a first round of interviews with stakeholders in the region.
This SWOT-analysis should result in at least two contrasting paths for the spatial economic development of the region. In our case study we found four key themes - critical success and failure factors - for the region of Utrecht, which is centrally located in the Netherlands. Utrecht is a relatively prosperous region, however its prosperity has its repercussions on the quantity of labour supply, the natural and living environment and the transport infrastructure capacity of the region. The region has to choose between ongoing economic growth (welfare) or the well-being of the present population, and for a further extension of the conventional transport infrastructure versus more investments in knowledge infrastructure.
Given those four themes (welfare versus well-being, conventional transport infrastructure versus knowledge infrastructure) the following four reference scenarios could be constructed:

- welfare and conventional infrastructure
- welfare and knowledge infrastructure
- well-being and conventional infrastructure

- well-being and knowledge nfrastructure

2.4 *The development paths to be covered by the spatial plan*

It is not necessary to develop a spatial economic development plan starting from scratch. The starting point is the present regional performance of the region. Moreover, policy makers have to consider the expected autonomous developments within the region. They have to interpret the autonomous regional trends and developments of the factors described in the four main spatial economic fields (see section 2.2) without policy actions. These policy-off developments result in an expected development of the region. This expected future spatial economic performance of the region has to be steered by policy measures towards the desired spatial economic performance. In other words: the policy measures - as recommended in the spatial economic development plan - have to fill the gap between the expected and desired performance of the region.

3. Case study: sustainable development of municipalities in the province of Utrecht

3.1 *Methodology*

In the case study the following nine steps are undertaken:

1. Desk-research: the regional context
2. Interviews experts: present situation, expectations and desires
3. A SWOT-analysis
4. Four reference scenarios: the edges of the playing field
5. Delphi session with experts
6. Draft scenario: expected and desired developments and recommended policy measures
7. Delphi session with experts
8. Final scenario: expected and desired developments and recommended policy measures
9. Political embedding

In the first phase an extensive literature survey took place in which policy documents. consultant reports and scientific studies were analysed. In step 2 experts were interviewed to fill gaps in the information and to achieve a satisfactory coverage of interest groups involved in spatial economic development. After this, planners, public servants, politicians of several governmental agencies and stakeholders of various interest groups were interviewed, for example, Chambers of Commerce, trade-unions, environmentalists, tourist agencies, real estate agencies, et cetera.

The desk-research and interviews are used to highlight the present situation in the region, the autonomous mega- and regional specific trends and expectations and desires concerning the future of the region. Furthermore, those research phases are used to apply a SWOT-analysis (Strengths, Weaknesses, Opportunities & Threats) on which the four reference scenarios are based. The aim of the SWOT-analysis is to identify the critical success and failure factors within the region. In the fourth step the four reference scenarios describing the edges of the playing field of the contrasting success and failure factors - welfare versus well-being and conventional transport infrastructure versus knowledge infrastructure - are constructed.

Those four reference scenarios formed the input for a Delphi-session with the in step 2 consulted experts and civil servants of the division economic affairs of several participating municipalities. By presenting the four contrasting reference scenarios the participants were

able to discuss several development directions for the region from a broader perspective than their own - often narrow - interest.
Based on the desk-research, the interviews and the Delphi-session in which the four reference scenarios were discussed, a first attempt is made to construct two new scenarios (based on the present situation, autonomous mega-trends and regional specific trends): 1.) the most likely expected development scenario and 2.) the desired future performance of the region scenario. This is visualised in a spider model showing the impacts of three scenarios: 1.) the present performance, 2.) the expected performance, and 3.) the desired performance. In addition a set of policy measures is formulated on how to steer the developments in the region from the expected future towards the desired future. The concept scenario and the set of policy measure recommendations were again the input for a second Delphi-session with the same participants for some further fine-tuning of the presented scenario and to get informed about the acceptance level of the recommended policy measures.
In step 8 the final scenario was built and, the policy measures were destilled which - based on high levels of acceptance (consensus) - should achieve the development from the expected towards the desired spatial economic performance.
The final step of political embedding is - to our opinion - a bridge to far for scientific involvement. The choice of which policy measures to implement - or not - and the way in which the regional development plan is backed up by all parties is a political game in which scientists should not interfere, given the independent - value-free - position of scientist in the whole planning process.

3.2 The context

The Utrecht region is located in the centre of the Netherlands. The city of Utrecht is the most eastern city of the main Dutch urban agglomeration called the Randstad. The city is built along the cross-roads of the main transport infrastructure arteries - road, rail and waterways - from the Randstad towards the Northwest European hinterland (see Figure 2).
The Utrecht region is economically flourishing due to its central location in the Netherlands and its strategic position between the Dutch economic heartland and the neighbouring countries, in particular Germany. In recent years many national and international oriented firms moved towards the Utrecht region. Utrecht became the service centre of the Netherlands.
However, this central and strategic position of the region has led to an unbalanced sectoral structure. The - business - service sector is very well developed; banks, insurance companies, information technology companies and research and development activities are relatively over-represented. More traditional sectors such as agriculture and industry are declining in total number of employees at a faster rate compared to the Netherlands as a whole. Not onlv the economic structure became unbalanced, it became unstable as well. The inflow of business service firms brought companies that are sensitive for fluctuations in the national economic performance and their activities are relatively foot-loose: a decrease in the location profile of the Utrecht region or an increase in the location profile of another region may easily lead to relocation decisions made by those foot-loose firms which are unfavourable for the Utrecht region.
This - increasing - unbalanced sectoral structure has implications for the regional labour market. Although the regional labour force is relatively high-skilled (due to the presence of an university and an academy), the demand for high-skilled labour exceeds the regional supply. As a consequence there is long-lasting group of low-skilled unemployed workers and a relatively high level of inter-regional commuting by high-skilled workers. Moreover, due to the spatial

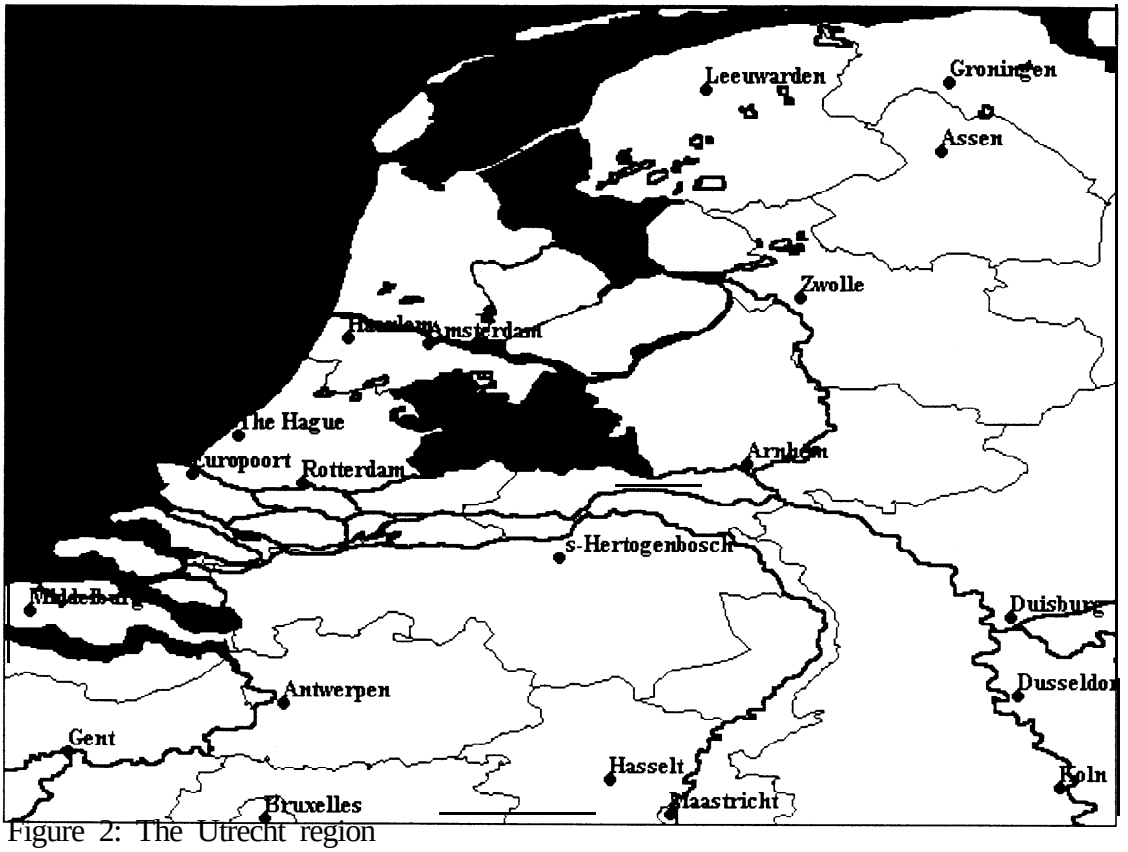


Figure 2: The Utrecht region

planning policy of the seventies there is a high level of intraregional commuting as well. In the seventies the Dutch government started to develop satellite cities around the main urban cities to fulfil the demands of the Dutch population for relatively cheep one-family-houses with garden. The government expected that the workplaces would follow the employees towards those new urban areas. This appeared to be a serious miscalculation. The workplaces moved from the inner city to the urban fringes of the city of Utrecht which are well-accessible by car but not by means of public transport.

The national highway network is heavily burdened by this local and intra- and interregional commuting. In 1996 six out of the ten most congested highway sections of the Netherlands were located in the Utrecht region. The transit function from the other Randstad cities (Amsterdam, Rotterdam and The Hague) towards the - German - hinterland is hard to fulfil, due to the use of the national highway network for local and regional purposes.

The Utrecht region is far from homogeneous in its physical structure. The eastern part is formed by the second last ice age. The end moraine of an ice floe formed a woodv hilly landscape with a sandy soil. Nowadays, this is a favourite residential and recreational area. The north-western part exists of peat polders which are in agricultural use, mainly as pasture land. The southern part is formed by the river Rhine. This area is also mainly used for agricultural activities, for instance fruit culture. The central part of the region is urbanised. In this area the city of Utrecht and its satellite cities Nieuwegein, Houten and IJsselstein are located.

Given this physical structure there exists a spatial unbalanced labour and housing market. Nearly three quarters of the jobs are located within the central urbanised area which is 10 % more as the share in the regional population. Moreover, a large share of the higher income groups has left the urbanised area and moved towards in particular the preferential residential areas in the eastern part of the region. Within the urbanised central area a relatively large share of the middle-income groups has left the central city for one-family-houses in the satellite

towns. The low income groups were bound to the council housing programs, which were all located within the city of Utrecht. Where the jobs demanding high-skilled labourers are concentrated especially in the urban fringes of the city of Utrecht, the high-skilled labourers moved out of the city. Over 64 % of the jobs in the city of Utrecht are occupied by commuters. Another problem is the fact that in the near future the number of jobs in the region will exceed the regional working population in absolute terms.
The departure of the high and middle income groups lead also to an increasing pressure on the level of the - regional - services and facilities such as specialised shops and cultural facilities offered by the city of Utrecht. In recent years the municipality started to support the construction of houses for the middle and higher income groups to try to secure and expand the level of services in the city.

To summarise, in the region there is a qualitative and in the near future quantitative discrepancy on the labour market. The labour market is unable to supply high-skilled workers in the demanded quantity. The region is characterised by rapid economic expansion. However, this expansion is in a few - merely foot-loose - economic sectors such as business services. The sectoral structure of the region becomes increasingly unbalanced and unstable. The employment growth is concentrated in the city of Utrecht, whereas the working force is more evenly spread over the region, which leads to high levels of commuting and congestion on the national highways. The high traffic intensities and economic expansion leads also to a decreasing quality of the natural and living environment in the region.
In the region space is a scarce good. There are huge spatial claims for dwellings, industrial sites, offices, agriculture, transport infrastructure, recreation and the conservation of areas of outstanding natural value or cultural historical landscapes. The region is unable to fulfil all spatial claims and needs a well-argumented set of selection criteria to facilitate these claims.
Spatial planning is rather delicate in such a region. There are many stakeholders representing all different interests. We used scenario analysis, visualised by spider models, to evaluate the pro's and contra's of each stakeholders' interest. In this way we could easily communicate the weak and strong points of each interest to all the stakeholders (including the stakeholder representing the specific interest). By such an evaluation mutual interest and understanding is created and stakeholders are more willing to cooperate in a more open discussion on desired spatial developments in the region. An open discussion is the doorway to reach consensus between stakeholders, politicians and policy makers.

3.3 The present situation

Before sketching future scenarios we have to shape the present situation in a reference scenario. As already described in section 2.2, each scenario is visualised by means of a spider model consisting of four fields each divided in four factors. Given the description of the region in the previous section the present situation can be briefly presented as follows (see Figure 3):

- *infrastructure*

The extensive transport infrastructure network within the region is of a good quality. However, due to the transit function of the region and the high commuting levels (local, regional and inter-regional) the mobility level is relatively high. As a result of the traffic intensity there are rather high levels of congestion, traffic noise and environmental pollution causing a negative net external effect.

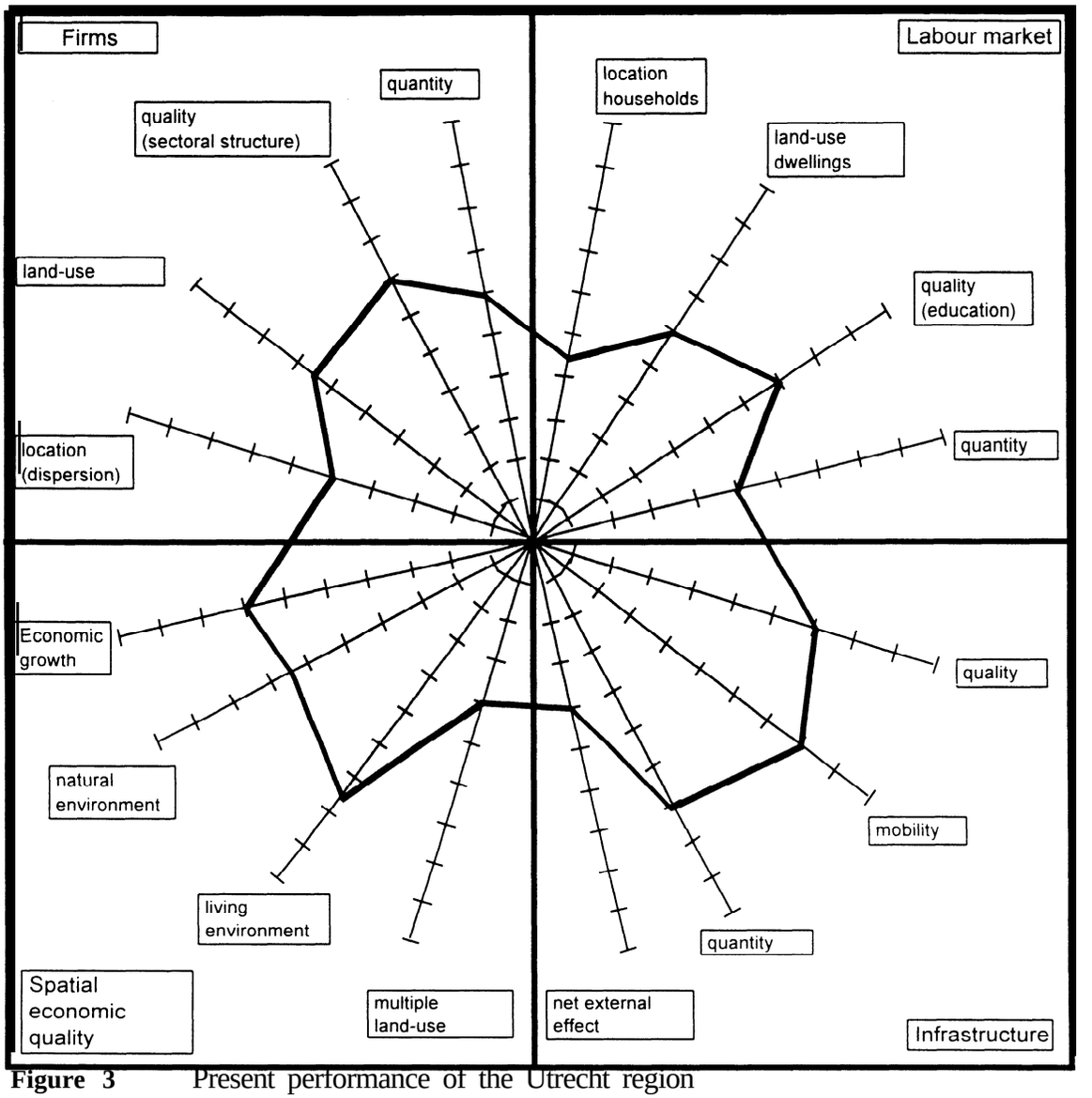


Figure 3 Present performance of the Utrecht region

- *labour market*

Although the average labourer is relatively high-skilled the supply is insufficient to meet the demand. On the other hand there exists a rather large group of low-skilled unemployed workers, which is are unemployed for a rather long period of time. There is also a shortage of dwellings. The land-use by dwellings is average.

- *firms*

The land-use of firms is relatively low, due to the strong orientation on offices. In offices the required square meters floor space per employee is rather low. The workplaces are spatially concentrated in and around the city of Utrecht. The firms offer workplaces to relatively high-skilled labourers, however there is a low diversity in economic activities. Most jobs are in the sectors such as business and public services. There is a shortage of jobs for low-skilled labourers.

- *spatial economic quality*

The rate of multiple land-use is rather low. There are a number of opportunities for multiple land-use by making agricultural land available for recreational activities and by combining agricultural activities with the preservation of natural or cultural historical landscapes. The

natural and living environment are quite diverse and of a relatively good quality in the region. However, they are threatened by spatial claims for dwellings, economic expansion and the extension of the transport infrastructure network. The economic expansion has been relatively high in recent years. However the sectoral structure has become increasingly unbalanced and unstable due to the strong orientation and dependency on relatively foot-loose activities in particular in the business service sector.

3.4 *Four scenarios: the edges of the playing field*

Not only the present situation is of importance for the future scenarios but also the autonomous developments - both mega-trends and regional specific trends - as far as their implications can be overseen.

Quite some developments in the spatial organisation are already given by existing spatial plans. For instance much attention is given to the development of a regional high quality network of public transport services. A new urban area - Leidsche Rijn - of 30.000 dwellings, nearly 200 acres of industrial sites and over 250.000 square meter of office sites are created on the west side of the city of Utrecht.

Another - autonomous - development is the spill-over of firms from the Randstad cities - Amsterdam, Rotterdam and Den Hague - along the main transport infrastructure corridors towards the eastern and southern part of the country. The Utrecht region will be even more centrally located in the economic heartland of the country in the near feature. In the light of these developments an increasing economic expansion and an increasing use of the road (highway) and rail network might be expected.

Given the present situation, the autonomous developments and the SWOT-analysis the following critical success and failure factors can be identified:

- conventional transport infrastructure
- knowledge infrastructure
- economic expansion and labour market
- living and natural environment and preservation of cultural historical landscapes

These success and failure factors can be transformed in two axes:

- *conventional transport infrastructure versus knowledge infrastructure*

It appears that good accessibility is one of the strongest location factors of the Utrecht region. However, it is at the same time one of the most critical and vulnerable elements of the regional location profile. The ongoing accessibility will be a critical success factor for the further expansion of the regional economy.

Another strong location factor is the presence of knowledge infrastructure such as academies, universities, technology institutes, science institutes, information institutes, research and development centres and care institutes (health, mental care, care for the aged, et cetera).

The conventional transport infrastructure and the knowledge infrastructure are a solid basis under the regional economy.

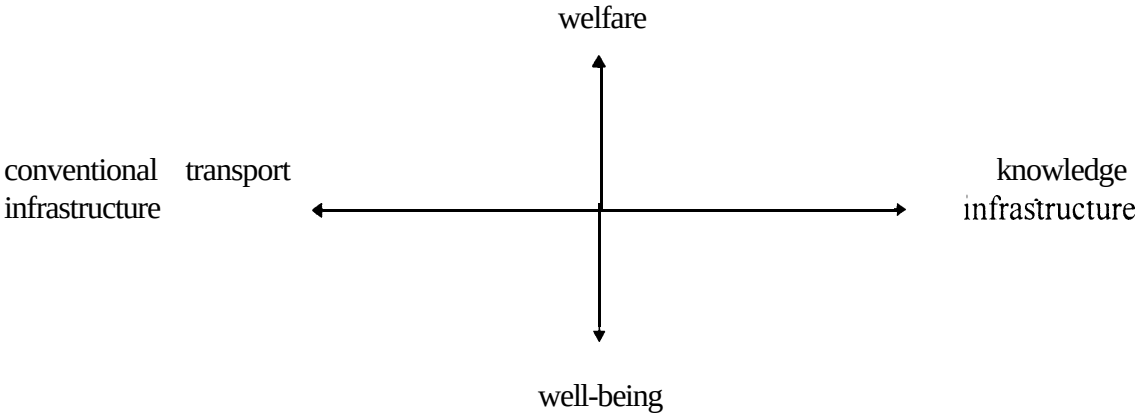
- *welfare versus well-being*

The economic expansion in recent years made the region very prosperous. However, everyone acknowledge that there are limits to this expansion. The limits are given by the scarcity of space and the absorption capacity of the natural and living environment.

In the axis ‘welfare’ stands for an optimal expansion of the economic opportunities as far as possible within the critical limits given ‘by the natural and living environment. Opposite stands ‘well-being’ for an orientation on the already existing population in the region. Economic development is allowed as long as it is in line with the quality and quantity of the

regional labour force and does not harm the quality and quantity of the natural and living environment.

The two axis form the following cross in which each quadrant show a direction in which the region can be developed:



The constructed scenarios are rather extreme to sketch the boundaries of the playing field in which the future developments of the region will take place. The scenarios are constructed in such a way that each scenario is internally consistent but they are mutually contrasting.
The following four contrasting scenarios are constructed:

- welfare and conventional transport infrastructure
- welfare and knowledge infrastructure
- well-being and conventional transport infrastructure
- well-being and knowledge infrastructure

Each scenario is visualised by means of a spider model in which the present situation is represented by a grey field and the situation according to the scenario by a black line. In this way the positive and negative developments compared to the present situation can be seen immediately.
In the next sections the four scenarios will be presented.

3.4.1 Welfare and conventional transport infrastructure

All economic opportunities will be facilitated, in other words; a free market economic development will take place (see Figure 4). The government has a passive role and facilitate industrial sites, office locations, dwellings and conventional transport infrastructure (roads, rail and waterways). This stimulation and facilitation of optimal economic growth will have negative impacts on the natural and living environment and the existence and preservation of landscapes with high cultural-historical values. Given the four fields of interest represented in the spider model, the following remarks can be made:

- *infrastructure*

In this scenario the rise in mobility will be facilitated by the construction of conventional transport infrastructure without paying much attention to the opportunities offered by technological developments such as guiding systems. The spatial claims for transport infrastructure expansion will be high in particular for the construction of more roads (for instance a second orbital motorway outside the present urban fringes of Utrecht) and parking

facilities. The individual - car - mobility will rapidly increase, which will have a serious draw-back on the levels of congestion and pollution.

- *labour market*

The regional labour market supply will be insufficient, both in quantitative and qualitative terms. Labour will be attracted from outside the region leading to higher commuting levels. The creation of jobs requiring high-skilled labourers will lead to an increase of middle and higher income groups. This presence of the high income groups in the region will lead to a further spread of residential areas in areas of outstanding natural beauty. The natural environment and the preservation of landscapes will suffer by this development and in the end the quality of the living environment will decrease by an over-utilising of those areas for residential activities.

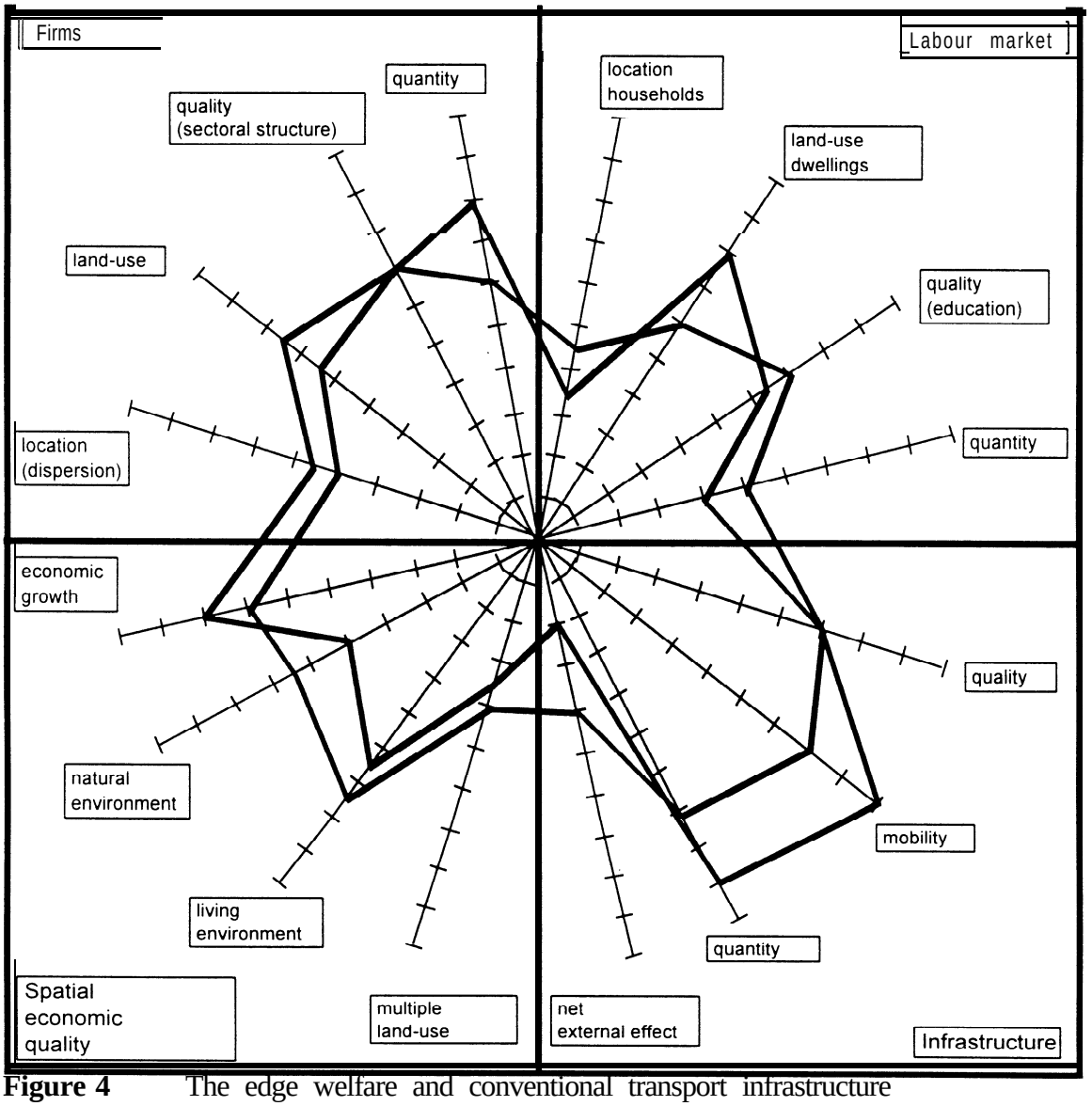


Figure 4 The edge welfare and conventional transport infrastructure

- *firms*

There will be a survival of the fittest among firms, which will lead to a dominant development of a few business service activities such as insurance, banks and information technology firms. The firms will concentrate on locations near the orbital motorway(s) of the city of Utrecht. The shortage of industrial and office sites will lead to an outflow of firms, starting by the least financial backed firms. The agricultural and industrial employment will decrease. The agriculture will have to give up much grounds for other economic activities, construction of transport infrastructure and residential purposes.

- *spatial economic development*

The ongoing economic growth will have negative implications for the natural and living conditions in the region. Large natural areas will be transformed into industrial sites, office parks and residential areas. The remaining landscape will be segmented by the extension of the transport infrastructure network.

3.4.2 Welfare and knowledge infrastructure

Like the first scenario this scenario strives to an optimal economic growth (see Figure 5). However, this should be realised under the condition of a solid basis of knowledge infrastructure. In the region there will be a concentration of knowledge centres, which will attract knowledge extensive and knowledge related firms. The existing transport infrastructure network will be optimal utilised by the introduction of all kind of technological innovations.

- *infrastructure*

As already stated, technology will have an important influence on the quality of the infrastructure network. Individual car guiding systems, in-car information systems et cetera will be introduced to reach higher levels of capacity utilisation without far-reaching extensions of the already existing physical network. To reach those high levels of capacity utilisation pricing systems will be introduced. This will lead to an increase in social inequality, because not everyone can afford to travel at the most preferred time period due to the price incentives. Although cars will be less polluting, the net external effect will still be negative due to the individual car mobility instead of the extensions of public transport means.

- *labour market*

The emphasis on knowledge infrastructure will place a further claim on high-skilled labourers. The regional labour market will be insufficient and this will lead to the attraction of labourers from outside the region and, by this, to higher levels of commuting. The information technology has a positive influence on the land-use of dwellings: by means of the information technology people can live in more compact constructed types of dwellings and neighbourhoods. High quality residential areas within the urban centres will be as favoured by the rich information adepts. The same holds for areas of outstanding natural beauty.

- *& firms*

The region will select a number of target activities for their economic growth: knowledge institutes and related activities. These activities will concentrate in the urbanised central area of the region. Face to face contacts are important in this business. The acquisition of other types of firms is irreversible to the success to attract knowledge based firms.

- *spatial economic development*

There will be a slight decrease in the quality of the natural and living environment due to the ongoing increase of individual - car - mobility and commuting levels. The attraction of 'clean' economic activities will have a neutral impact in the on the environment as long as the

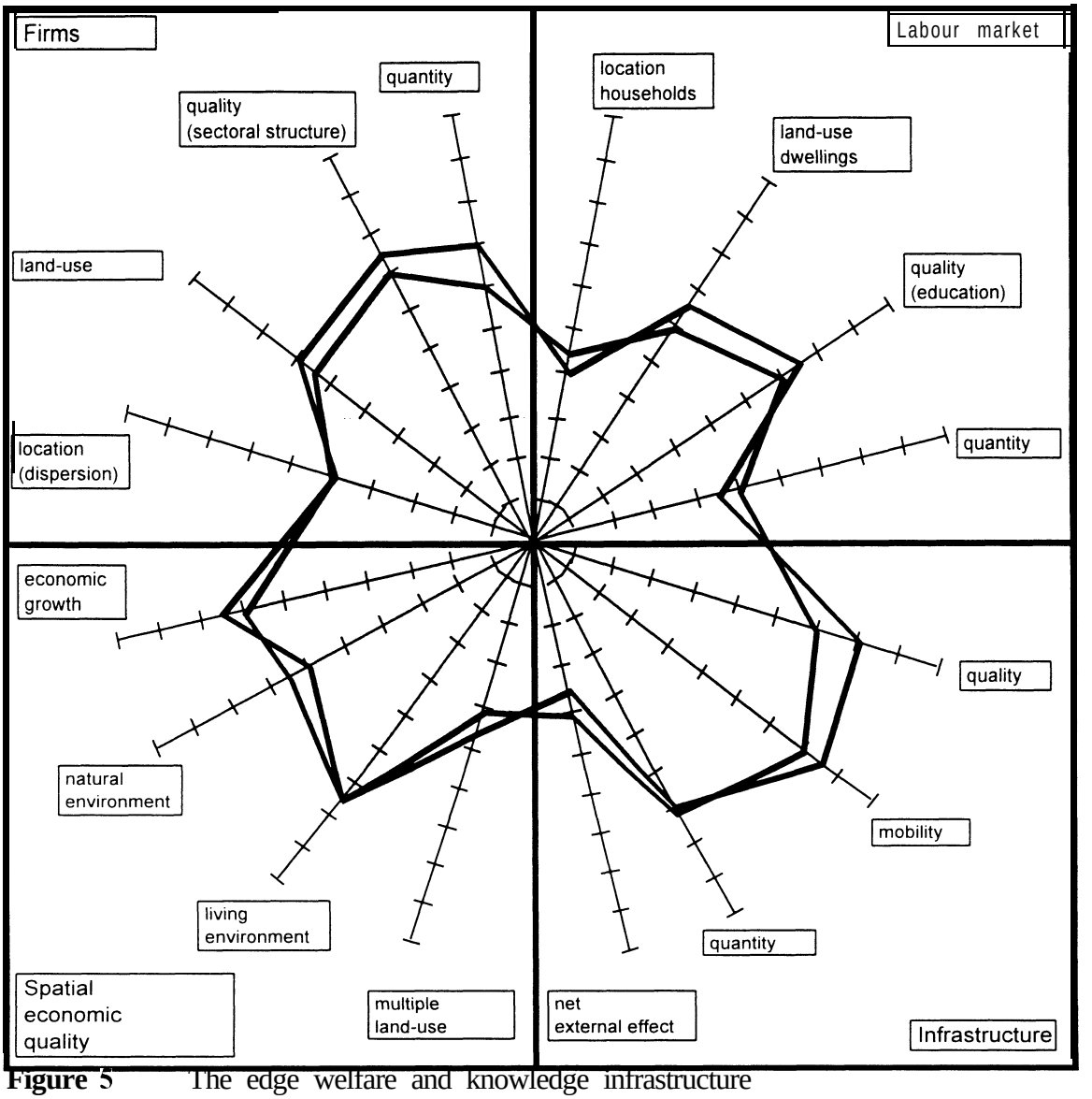


Figure 5 The edge welfare and knowledge infrastructure

extension of those activities can be realised on sites with relatively low natural values. A good example is the restructuring of old industrial sites.

3.43 Well-being and conventional transport infrastructure

In the third and fourth scenario the perspective changes from facilitating economic growth towards satisfying the utility of the regional population and the preservation of their natural and living environment (see Figure 6). In the scenario where the well-being of the population is combined with the conventional transport infrastructure network, the city of Utrecht will be the central growth pole for the development of residential areas, work places and services such as shops and cultural facilities. There will be a restructuring process to improve the living conditions in urban areas. One important difference with the previous two scenarios is the emphasis on public transport instead of individual car mobility. Huge investments are involved in shaping a high quality public traffic network. Another difference in transport is the emphasis on multimodal transport of goods in particular in combination with the use of waterways (the river Rhine and the Amsterdam-Rhine canal).

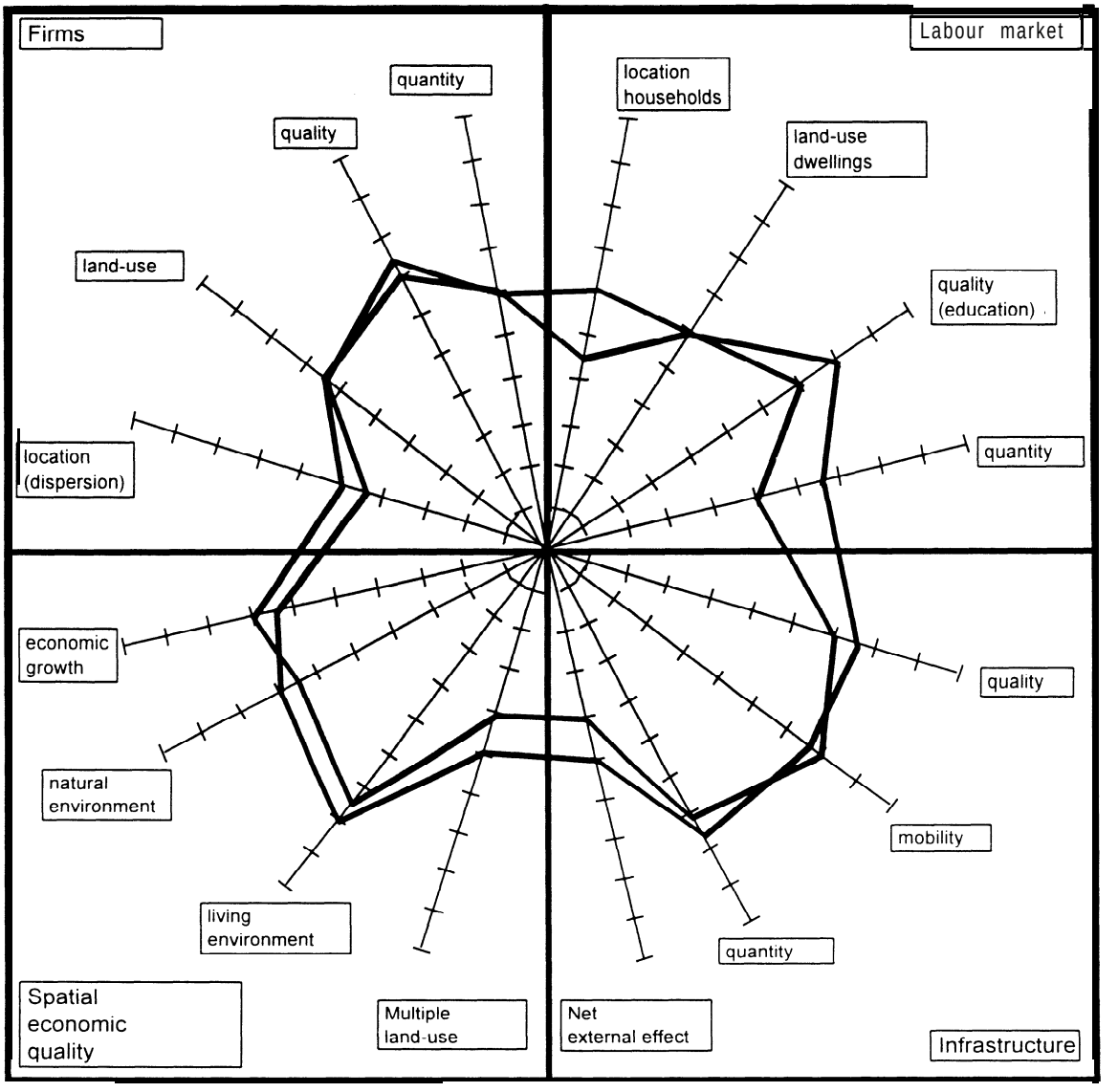


Figure 6 The edge well-being and conventional transport infrastructure

- *infrastructure*

As already mentioned, the government plays an active role in persuading the population to use public transport means. Individual car traffic will be strongly discouraged by strong environmental regulation. Individual travelling will slightly decrease and there will be a strong increase in collective travel. In intermodal freight transport waterways and underground pipeline systems will play important roles. Public transport and intermodal freight will lead to a reduction in the overall pollution caused by the traffic system. The net external effect will be slightly positive compared to the present situation.

- *labour market*

On the labour market the supply side is conditioning the acquisition of new firms: firms are selected according to the size and skills of the available regional labour force. This means that some economic opportunities are rejected so that there will be no optimal regional economic growth. Since the jobs offered by firms will not exceed the available labour force in the region there will be a reduction in interregional commuting. To create the critical masses necessary for high quality public transport there will be a concentration of work places and residential areas. The city of Utrecht will improve the living conditions of its residential

areas, since the residential function of the city has to improve. The city is offering the highest service levels of public transport.

- *firms*

Given the importance of the living and natural environment in the region, there will be an emphasis on the acquisition of 'clean' environmentally friendly activities. However, it is important to offer a wide spectrum of economic activities to attune to the qualities of the regional labour force. Firms will be concentrated in locations within the urbanised central region, which are well accessible by public transport.

- *spatial economic quality*

Economic growth will be lower than in the previous two scenarios. The attraction of 'clean' economic activities and the emphasis on public transport will lead to a slight improvement of the conditions in the living and natural environment. The concentration of work places and residential areas will reduce the spatial claims of those activities. There will be more opportunities to honour the spatial claims for the preservation of natural and cultural historical landscapes .

3.4.4 Well-being and knowledge infrastructure

In this scenario the emphasis is on the development of small scale services and care institutes in all urban centres in the region (see Figure 7). There is a strive to create relatively autarky local units within the region. The employment should be conditioned to the local labour force. Commuting should be kept minimal. The quality of the natural environment is a dominant factor.

- *infrastructure*

The main emphasis is an reduction in mobility. The transport system should be of a high quality and environmentally friendly. The mobility should be covered by innovative collective transport means such as people movers. The strive to reduce mobility will be supported by the introduction of distance working, learning and tele-shopping. For freight transport an underground pipeline system will be developed. The net external effect of transport will be clearly positive given the low negative external effects.

- *labour market*

Due to the emphasis on knowledge infrastructure there will be a high demand for high-skilled labourers which cannot be covered by the available regional labour force. To tackle this problem the government will initiate educational programs for low-skilled unemployed labourers. The strive to local autarky - to reduce mobility - will lead to a distribution of work places over the local centres according to the population distribution in the region. The information technology will make services above the local level available. Given the local autarky there is an increased preference to locate in the small centres of the region.

- *firms*

According to the population firms will locate more than in the previous scenarios in the small centres of the region. The firms will be knowledge based or related, relatively small and environmentally friendly. Nevertheless there is a strive to a balanced and diverse sectoral structure to create a stable economic situation in each individual local centre.

- *spatial economic quality*

There will be a strong improvement of the environmental quality in the region through the emphasis on nature preservation. The economic growth is relatively low compared to the other scenarios, but stable due to the balance between labour force and the diversity in the economic structure. The position of the city of Utrecht is less dominant in this scenario.

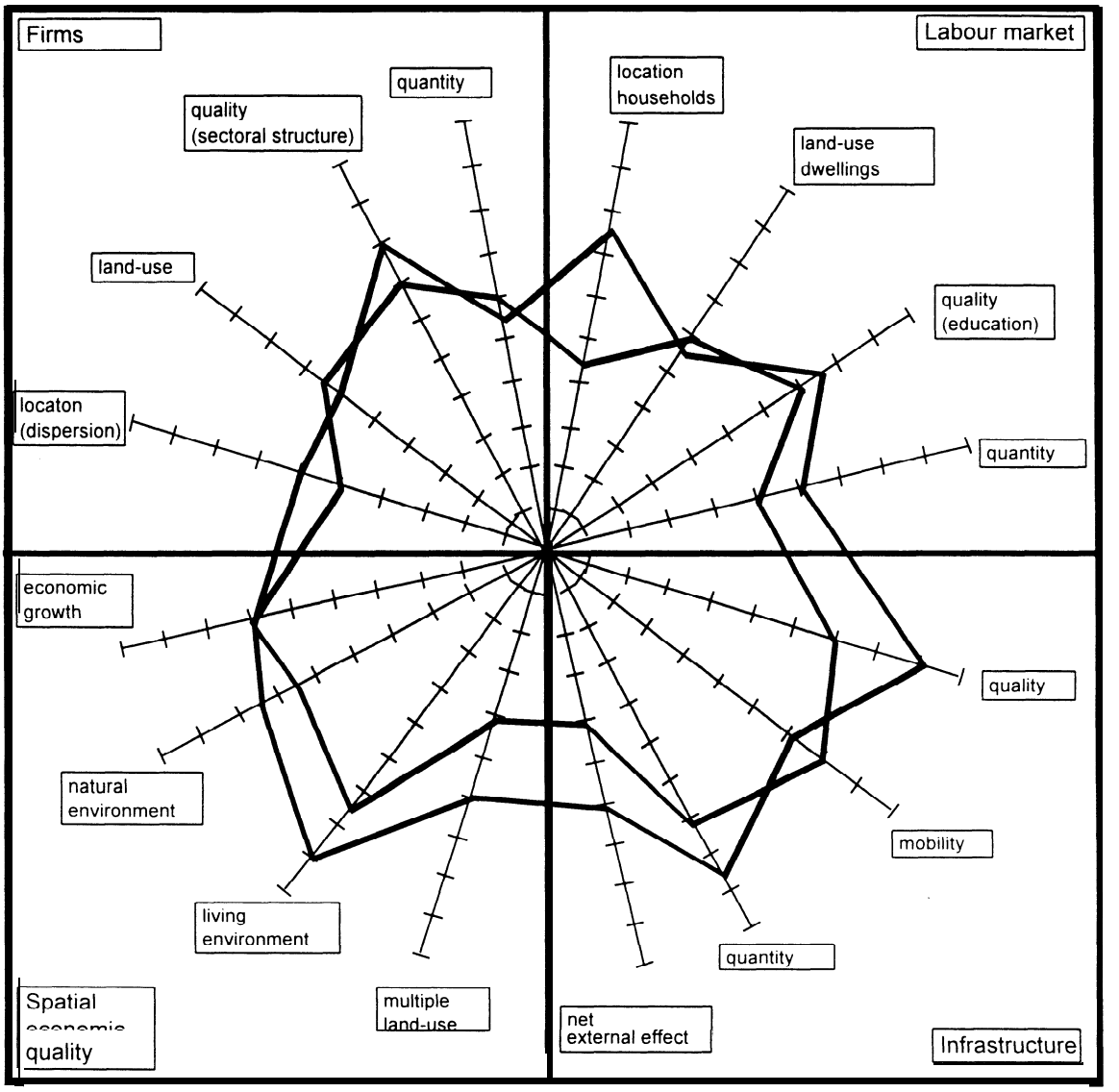


Figure 7 The edge well-being and knowledge infrastructure

3.5 The discussion with stakeholder, politicians and policy makers

The four scenarios were the input for a discussion session with stakeholders, politicians and policy makers. We started with a plenary session in which an introduction of the pro's and contra's of each scenario was given. The pro's and contra's represented indirectly the strong and the weak spots of the interests of most stakeholders. After this introduction everyone was aware of the interests of each of the participants, and each stakeholder was aware of the weak spots linked to his own interest. By this an atmosphere was created where there was mutual understanding of each other's interests on the one hand, and the willingness to discuss the relative importance of their own interest in relation to the other - contrasting - interests on the other hand. The doorway to achieve consensus was opened.

After the plenary session a discussion in three groups took place. The members of each group had contrasting interests and their task was to develop consensus about the expected and desired development path for the Utrecht region. The previously presented four scenarios only sketched the edges of the playing field, the groups did not have to select a favourite one. Afterwards in a plenary session each group had to present their expected and desired regional development path.

The output of this session led to the construction of two scenarios which may boost a reasonable degree of consensus in which the expected and the desired development for the Utrecht region are sketched.

3.6 Expected and desired development

The last three stages of research are: 1.) the construction of the expected and desired spatial economic development paths for the Utrecht region and the formulation of a set of policy advises how to achieve the desired development by additional policy measures, given the present performance and the expected development path of the region, 2.) a second Delphi-session with all parties in the region to discuss the scenarios and the advised policy measures, 3). the construction of the final expected and desired scenario for the Utrecht region and the formulation of recommendations for additional policy measures to steer the performance of the Utrecht region from the expected towards the desired development path.

Given the division of tasks the role of scientists in the planning process stops at this points. The final choices which recommendations are accepted - and which are rejected - and the course of implementation of the accepted policy measures are part of the political arena.

We will end the case study by presenting the final spider model and a short outline of the policy measures recommended in case of the Utrecht region (see Figure 8).

- *infrastructure*

The analvsis shows that although the present transport infrastructure network is of a high quantitative and qualitative level, it is insufficient to cope with the expected increase in mobility. However, given the living and natural environment it is undesirable to limitless continue extending the transport infrastructure network to increase capacity. Given the present situation and actual plans it might be expected that the mobility increase will exceed the extension of the infrastructure capacity. It is desirable to slow down the growth in mobilitv and slightly improve the infrastructure capacity. The policy measures should be in favour of a further development of public traffic and try to control individual car mobility.

Additional policy measures should be directed towards:

- a slow down of the growth in car mobility (pricing policies)
- introduction of technological innovations such as car guiding systems
- optimise infrastructure capacity (for instance by the promotion of flexible work hours)
- separate transit and local/regional transport flows (requires more attention for the underlying road network)
- initiate regional public traffic where there is a potential and link this network to the interregional public traffic network

- *firms*

Given the present situation it is expected that the economic sectoral structure becomes smaller and more unstable by the inflow of more - rather foot-loose - business sector firms. Those business sector firms - banks, insurance companies, information technology firms - will locate in the central urbanised area of the region, in particular around the main city of Utrecht. These working places are highly accessible by car but inaccessible bv means of public transport. The jobs offered by those firms cannot be occupied by workers from the regional labour market: they are outnumbered and insufficient skilled.

Desired is a controlled inflow of selected firms to secure the diversity in the regional economic structure and which corresponds rather well with the conditions (availability and skills) of the regional labour market, the living and the natural environment. There will be

strived for a regional dispersion of economic activities in line with the population density. However at the local level work places - and residential areas - should be spatiallv concentrated.

Additional policy measures might be:

- selective acquisition of firms (diversity and target sectors)
- regional dispersion and local concentration of firms.
- firms correspond to the quality and quantity of the regional labour market
- selective development along infrastructure corridors

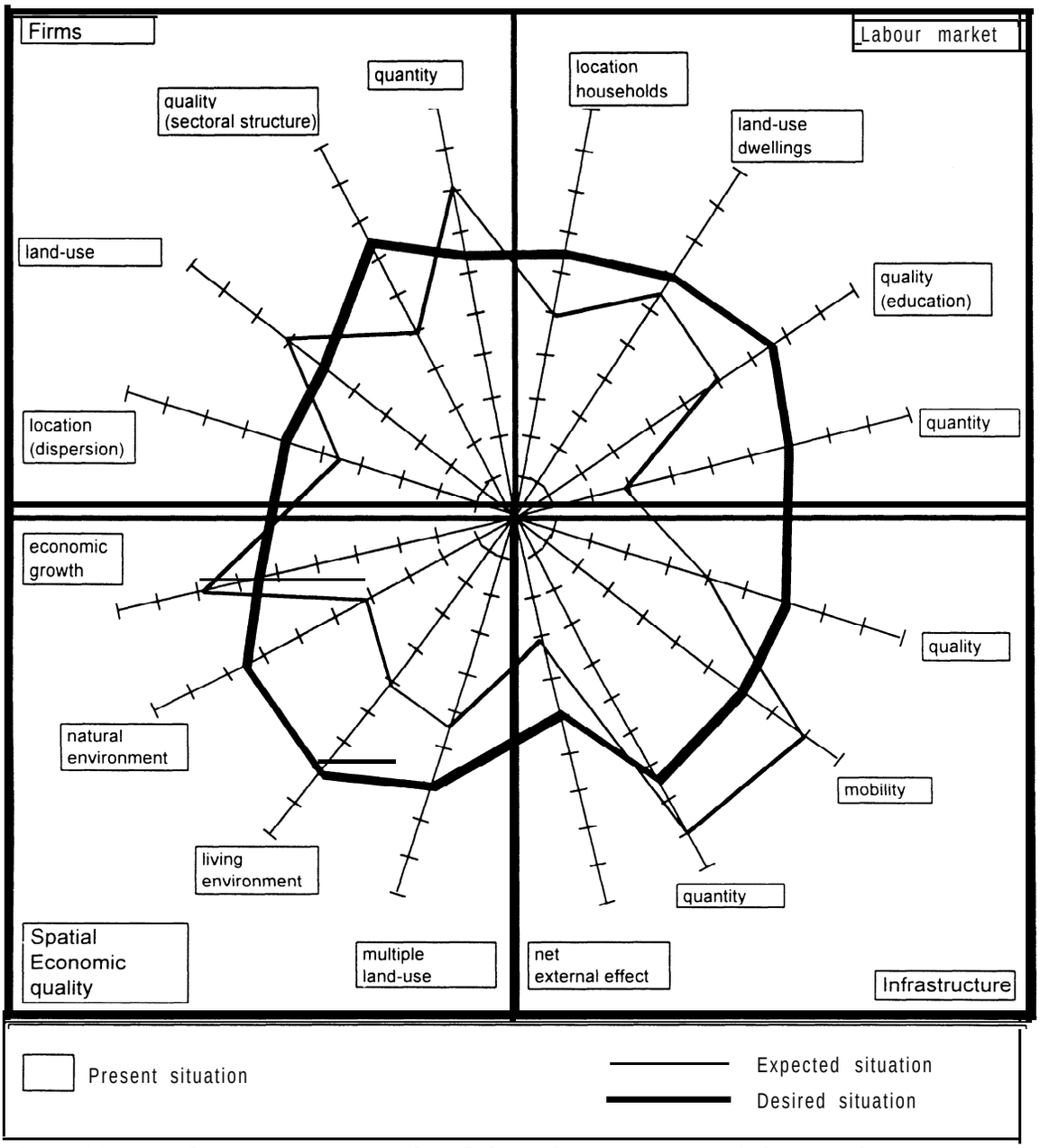


Figure 8 The present, expected and desired performance of the Utrecht region

- *labour market*

The expected ongoing growth of the business service sector firms will lead to an increasing demand for high-skilled labourers. The regional labour market is insufficient to absorb this growth. Increasing levels of inter-regional commuting are expected. There exists a spatial discrepancy between the location of the work places and the residential areas leading to relatively large levels of intraregional commuting. In recent years the awareness of discrepancies on the housing market grew. In particular the city of Utrecht is trying to increase the number of dwellings for the middle and higher income groups. However, to overcome these intraregional discrepancies policy measures have to be taken on both the housing market and the location of firms: no further concentration of work places in the urbanised centre whereas the dwellings are constructed conform the actual population densities.

Additional policy measures might be:

- job creation and /or education programs for unemployed low-skilled labourers
- diversified housing programs
- reduction of commuting levels (for instance by analysing mobility patterns of different target groups)

- *Spatial economic development*

It is expected that the economic growth will be relatively high for a number of years. This will lead to decreasing accessibility within the region, increasing discrepancies at the housing and labour market and a decrease in the quality of the living and natural environment. Desired is a selective growth of a few target sectors such as the care institutions (this sector is a growth sector in the Netherlands due to the ageing of the Dutch population and the preferred residential areas in the region for this group). Most important is a diverse economic structure and a consolidation or improvement of the present living and natural environment.

Additional policy measures might be:

- promotion of the regional awareness of the need not to facilitate all the economic opportunities offered
- promotion of the preservation of historical cultural landscapes
- promotion of the image of the region as an attractive region to work and live in

4. Conclusion

The previous elements formed the foundation for the communicative experiments on negotiations with stakeholders. Given the comprehensive nature of the approach and the possibility for everyone to be involved, the final result of the procedure could boost on a high degree of support among all key actors.

Regional policy is increasingly a bottom-up activity at the interface of public and private interests. Regional policy-making is not based on a top-down controlling and steering behaviour, but on an interplay with many stakeholders. Against this background, there is an increasing need for information which can act as scientific communication tool between actors. In the present paper it has been demonstrated that the use of visualisation tools can offer useful vehicles for interactive planning in which experts play an intermediate role between various institutions involved in regional planning. The use of such interactive tools appears to create a useful platform for consensus in situations of conflicting interests. This

approach offers also opportunities to include research findings based on regional impact assessment and statistical information available.

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